THE RAINFALL OF AMOY, CHINA.

By JOHN H. FESLER, United States Consul, dated Amoy, October 25, 1902.

The autumn rice crop in this province bids fair to be almost an entire failure, owing to the extremely small amount of rain which has fallen.

The rainfall at this port, it is interesting to note, has shown a steady decrease for the past six years, as is shown in the following table:

Year.	Inches.
1897	57.75
1898	46.24
1899	43.61
1900	38.70
1901	36.28
1902 (first eight months)	26.13

As the rainfall for the last four months of the year averages not to exceed 2 inches, the total for 1902 will probably be less than 30 inches.

Local observers ascribe this steady decline to a coincident decrease in the force of the southwest monsoon.

The theory, based on these facts, is that the failure in the monsoon is due to alterations in the Japan Current, and that these alterations in turn are caused by deep sea seismic disturbances, which have culminated in the numerous volcanic eruptions which have recently taken place in various parts of the world.

Whatever the cause, it is certain that the continued and increasing shortage of rainfall is lessening the productive power of this portion of China, and is causing much hardship and discontent.

[NOTE.—Such periods of small and large annual rainfall occur all over the world in succession and have to do with the general circulation of the atmosphere; earthquakes, ocean currents, etc., do not explain them. Changes in the amount and quality of the heat received from the sun, or of the heat radiated from the earth and the atmosphere, would affect the temperature and circulation of the atmosphere, and, therefore, the local rainfalls. An equally important factor is the internal mechanism of the atmosphere and the modifications of the general circulation that can occur within a limited range under a constant rate of radiation from the sun. These two sources of change in meteorological phenomena must be thoroughly investigated and evaluated before undertaking the study of such minor matters as the influence of earthquakes and ocean currents.—*C. A.*]

THE CIRCUMHORIZONTAL ARC.

By LOUIS BESSON, Paris, France, dated November 12, 1902.

In the MONTHLY WEATHER REVIEW for June, 1902, Vol. XXX, p. 317, there is reproduced a very interesting observation by Mr. J. A. Warren, of Santee, Nebr., who, on the 23d of June last, saw a rainbow arc parallel to the horizon at about 45° below the sun. In commenting upon this observation the Editor says that, so far as he knows, this is the first description of a horizontal circle tangent to the halo of 46° at its lowest point.

This particular tangential arc has a name in optical meteorology; it is called the circumhorizontal arc. In his "Note on halos," published in the Annuaire Météorologique de France for 1851, Bravais says that the theory of this arc is due to Galle; it is caused by the refraction of the light in the diedral angles of 90° at the lower base of the vertical prisms of ice, in the same way that the circumzenithal arc is due to the diedral angle of 90° at the upper edge of the same prisms. Theory indicates that this phenomenon only becomes apparent if the altitude of the sun is between 59° and 78°. I have not made the calculation but, judging from the latitude of the place, the date, and the hour, this condition seems to me to have been complied with at the time of Mr. Warren's observation. Was it really a circumhorizontal arc that was seen? This does not appear to me absolutely certain for the following reason. When the sun is very high in the sky the halo (of 46°) is very nearly parallel with the horizon, it would be absolutely so with a zenithal sun, and if an arc extending only a short distance from the lower part of this halo is seen, its parallelism with the horizon may seem to be perfect, especially if the arc is broad. Thus, according to the description given by the observer, the arc seen at Santee was very broad and quite short. It may then be asked if this was not merely the lower part of the circle of 46°?

In the note quoted above Bravais makes this remark: "The circumhorizontal arc is difficult to distinguish from the halo of 46° because the curves have the same direction and are near to each other." This difficulty must, indeed, be very great, if we may judge by the difficulty frequently experienced in distinguishing short and diffuse circumzenithal arcs from the halo of 46°, even although in this case the curves be in the contrary direction. It does not, therefore, seem to me to be possible to

consider the phenomenon of Santee as a certain and authenticated instance of the appearance of the circumhorizontal arc of Galle.

However this may be, it may be asked why it is that this arc is rarely or never seen, whereas the circumzenithal arc is relatively common. I have given an explanation, which I believe to be satisfactory, in a note entitled "The halo of April 5, 1899," and published in the Annuaire of the Meteorological Society of France, 47th year, 1899. According to my opinion the lower extremities of the ice prisms are not plane, but pointed, on account of the existence of oblique facets. Consequently, as the diedral angles of 90° necessary to the formation of the circumhorizontal arc do not exist, this phenomenon can not take place. The same hypothesis gives at one and the same time the explanation of the vertical orientation of the axes of the prisms, which latter is incomprehensible if we admit that these prisms are regular; their nearly vertical position is due to the fact that the resistance of the air is very small when the pointed end is turned toward the bottom.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of H. H. Cousins, chemist to the Government of Jamaica and now in charge of the meteorological service of that island, we have received the following table in advance of the regular monthly weather report for Jamaica:

Comparative table of rainfall for October, 1902.

Divisions.	Relative area.	Number of stations.	Rainfall.	
			Average.	1902.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	21	13.87	7.41
Northern division	22	47	7.99	5.58
West-central division	26	21	14.13	10.91
Southern division	27	32	12.42	4.87
	100	120	12.10	7.19

The rainfall for the whole island was very much below the average. The heaviest fall recorded was 22.73 inches, at Troy, in the west-central division; the lowest was 1.12 inches, at Pedro Plains, in the southern division.

NOTES AND EXTRACTS.

WEATHER BUREAU MEN AS INSTRUCTORS IN METEOROLOGY.

Mr. H. W. Richardson, Local Forecast Official at Duluth, Minn., states that on Tuesday, October 14, he began a series of seven weekly lectures to the pupils of the State Normal School at West Superior, Wis., on subjects that have been arranged so as to conform as nearly as practicable to the meteorological studies of the class in physiography. The addresses will be given in the large lecture room and to the entire school. The topics to be discussed are as follows:

(1) The Weather Bureau. (2) Meteorological instruments; theory, construction, and use. (3) Circulation of the atmosphere; pressure, temperature, winds, and precipitation. (4) Cyclones, hurricanes, thunderstorms, and tornadoes. (5) Cold waves, warm waves, frost, dew, etc. (6) The weather of the United States, with especial reference to the climate of Duluth and West Superior. (7) Weather maps and how to use them.

We understand that, as a preliminary arrangement, these lectures will be delivered with the aid of a few notes and that no formal papers have been prepared on the above subjects. We would, however, respectfully suggest that it would be well to reduce to writing such a systematic series of lectures by one of our oldest observers and give the newspapers or other publishers a chance to print and distribute for the benefit of a larger class of students.

Mr. James H. Scarr, Observer, Weather Bureau, Sacramento, Cal., has made arrangements to deliver a lecture on the Weather Bureau in that city.

Mr. J. Weeks, Observer, Weather Bureau, Macon, Ga., reports lecturing to a portion of the members of the class in physical geography in the High School in that city. The lecture will be repeated hereafter to the members of the class.

BACK NUMBERS OF THE MONTHLY WEATHER REVIEW.

The Editor is informed that the Library of the Royal Meteorological Society, Prince's Mansions, 70 Victoria street, London, S. W., desires to obtain the MONTHLY WEATHER REVIEW for March and April, 1875, in order to complete its set. As neither of these numbers can be furnished by the Central Office, the Editor would be glad to hear from any one who can supply them, or, possibly, the complete volume for 1875.

WATERSPOUT AT CAPE MAY, N. J.

Mr. H. A. McNally, Observer, Weather Bureau, reports that on October 7, 4:30 p. m., at Cape May, N. J., a low and ominous cloud was observed scudding over the ocean from southwest to northeast. At 4:44 p. m. a disturbance in the water slightly in advance of the front of the approaching cloud quickly developed into a cone, with its point uppermost and moved rapidly toward the southwest. In a very short time a similar cone, point downward, was seen on the lower surface of the cloud. In less than a minute the two points came in contact and an ideal hourglass formation was maintained for two or three minutes. The waterspout gradually became cylindrical and moved rapidly in the same direction as the cloud, but suddenly disappeared upward as though drawn up by suction. Rain was observed falling from the cloud as it advanced toward the northeast. The spout was distant about 5 miles and lasted six or seven minutes.

SEVERE HAILSTORM AT ST. LOUIS, MO.

The hailstorm at St. Louis, Mo., at 9:20 p. m., Sunday, October 12, was remarkable, not only because of its occurrence at night, but because of the size of the hailstones, the largest were certainly as large as hens' eggs, and, although it lasted but seven minutes, yet it was the worst hailstorm that has ever visited St. Louis. It covered an area extending from Tower Grove Park on the south to the fair grounds on the north and thence northwestward and southeastward to an unknown extent. The general progress of the storm as it approached from the west was foretold as to rain, but the hail seems to have been a local phenomenon. Dr. R. J. Hyatt, Local Forecast Official at St. Louis, says that the storm did not have the customary oval shape, but was of irregular formation and very jagged.

VOLCANIC AND ATMOSPHERIC PHENOMENA.

Mr. Hermann E. Hobbs, Observer, Weather Bureau, at St. Kitts, W. I., under date of October 24, writes as follows:

St. Kitts and Dominica.—Very little out of the ordinary occurred after the 8th of June, 1902, until the 4th of August, when at 7:57 p. m. there was a severe shock of earthquake. This shock, like the previous ones of recent date, was sharp and appeared to be vertical rather than horizontal in movement. There was another on August 17 at 6:16 p. m., slight; one on September 11 at 7:54 a. m., and one in the early morning of September 15 between 12 and 1 a. m. The heavier shocks were preceded by a preliminary rumbling noise. There have been no earthquakes since the last date.

On the evening of the eruption of August 30 there was a succession